

WHAT IS CLAIMED IS:

- Add B1*
- ~~1. A virtual reality generator comprising an input module that receives as input financial information; and means for outputting to a display device a virtual reality world generated from the financial information.~~
  - ~~2. The virtual reality generator of claim 1 wherein the financial information is pre-processed by a financial analytic system prior to input to the virtual reality generator.~~
  3. The virtual reality generator of claim 2 wherein the financial analytic system pre-processes the financial information in real-time.
  4. The virtual reality generator of claim 1 wherein the financial information is received from a data file.
  5. The virtual reality generator of claim 1 wherein the financial information is received from a real-time data source.
  6. The virtual reality generator of claim 1 wherein the display device is a monitor.
  7. The virtual reality generator of claim 1 wherein the display device is a visual stereoscopic head-mounted display device.
  8. The virtual reality generator of claim 1 further comprising means for dynamically displaying and continuously updating the virtual reality world.
  9. The virtual reality generator of claim 1 further comprising means for simulating movement through the virtual reality world under the control of a control device.

~~10. The virtual reality generator of claim 9 wherein the control device is a trackball.~~

11. The virtual reality generator of claim 9 wherein the control device is a data glove.

12. The virtual reality generator of claim 9 wherein the control device is a binocular omni orientation monitor.

13. The virtual reality generator of claim 9 wherein the control device is a mouse.

14. The virtual reality generator of claim 9 wherein the control device is a wand.

15. The virtual reality generator of claim 9 wherein the control device is a joystick.

16. The virtual reality generator of claim 9 wherein the simulated movement is controlled by movement of a headset containing the display device.

17. The virtual reality generator of claim 1 wherein the virtual reality world comprises a plurality of metaphors, each one of the plurality of metaphors representing a subset of financial information.

18. The virtual reality generator of claim 17 wherein the plurality of metaphors are output for display as graphical primitives.

19. The virtual reality generator of claim 17 further comprising a user interface module controlling a window display, the window display enabling input of a plurality of parameters to define the characteristics of the plurality of metaphors.

~~20. The virtual reality generator of claim 19 wherein the plurality of parameters and the financial information determines the size, shape, color, and movement of each one of the plurality of metaphors.~~

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21. The virtual reality generator of claim 19 wherein each one of the plurality of metaphors has a visual consistency and wherein a predetermined one of the plurality of parameters and the financial information  
10 determines the visual consistency of each one of the plurality of metaphors.

22. The virtual reality generator of claim 19 wherein each one of the plurality of metaphors has a texture and  
15 wherein a predetermined one of the plurality of parameters and the financial information determines the texture of each one of the plurality of metaphors.

23. The virtual reality generator of claim 17 wherein  
20 the plurality of metaphors are animated.

24. The virtual reality generator of claim 1 wherein the virtual reality world is defined by a configuration parameter set.

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25. The virtual reality generator of claim 24 further comprising a memory wherein the configuration parameter set is stored in the memory.

30 26. The virtual reality generator of claim 1 wherein the financial information is pre-processed by a knowledge-base system prior to input to the virtual reality generator.

35 27. The virtual reality generator of claim 1 wherein the financial information is pre-processed by a neural network prior to input to the virtual reality generator.

~~28. A virtual reality generator to display on a display device a stream of financial information received from a financial analytic system as a virtual reality world, the virtual reality generator comprising:~~

5       an input module to continuously receive the stream of financial information from the financial analytic; and  
a virtual reality generator module including:

10           (i) means for generating and continuously modifying the virtual reality world so that the virtual reality world correspondingly represents the stream of financial information,

         (ii) means for causing the virtual reality world to be displayed on the display device from a plurality of perspectives, and

15           (iii) means for simulating, on the display device, movement through the virtual reality world.

29. A virtual reality generator to display on a display device financial information as a virtual reality world, the virtual reality generator comprising:

20       an input module to receive as input the financial information; and

a virtual reality generator module including:

25           (i) means for generating the virtual reality world representing the financial information,

         (ii) means for causing the virtual reality world to be displayed on the display device from a plurality of perspectives, and

30           (iii) means for simulating, on the display device, movement through the virtual reality world.

30       The virtual reality generator of claim 29 wherein

35       the input module receives the financial information from

~~a real-time data source.~~

~~31. The virtual reality generator of claim 29 wherein the input module receives the financial information from a database.~~

5 32. The virtual reality generator of claim 29 wherein the input module receives the financial information from a real-time data source and a database.

10 33. The virtual reality generator of any one of claims 29, 30, 31 or 32 wherein the financial information is pre-processed by an analytic system prior to receipt by the input module.

15 34. A virtual reality generator to display financial information as a virtual reality world, the virtual reality generator comprising:  
an input module receiving financial information from a financial analytic system;

20 a user interface module receiving as input a plurality of display parameters and a plurality of filter parameters, the user interface module modifying the financial information to comply with the plurality of filter parameters; and

25 a virtual reality generator module generating and continuously modifying a virtual reality world, the virtual reality world representing the modified financial information and satisfying the plurality of display parameters.

30 35. The virtual reality generator of claim 34 wherein the virtual reality generator module further comprises means for displaying the virtual reality world from a plurality of perspectives.

35 36. The virtual reality generator of claim 34 wherein the virtual reality generator module further comprises  
~~means for simulating movement in the virtual reality~~

~~world.~~

37. The virtual reality generator of claim 34 wherein  
the modified financial information is displayed as a  
5 plurality of metaphors in the virtual reality world.

38. The virtual reality generator of claim 34 wherein  
the plurality of metaphors are geometric primitives.

10 39. The virtual reality generator of claim 34 wherein  
the plurality of metaphors are polygons.

40. The virtual reality generator of claim 34 wherein  
the plurality of metaphors are rotatable.

15

41. The virtual reality generator of claim 34 wherein  
the plurality of metaphors have variable luminance.

42. The virtual reality generator of claim 34 wherein a  
20 subset of the plurality of metaphors is selected to  
rotate by a predetermined one of the plurality of display  
parameters, each metaphor in the subset generated by the  
virtual reality generator module such that it rotates.

25 43. The virtual reality generator of claim 34 wherein  
the plurality of metaphors have user defined textures.

44. The virtual reality generator of claim 34 wherein  
the plurality of metaphors are colored.

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45. The virtual reality generator of claim 44 wherein  
the color of each of the plurality of metaphors is  
determined by a predetermined one of the plurality of  
display parameters.

35

46. The virtual reality generator of claim 34 wherein a  
~~subset of the plurality of metaphors is selected to flash~~

~~by a predetermined one of the plurality of display~~  
parameters, each metaphor in the subset generated by the  
virtual reality module such that it flashes.

5 47. The virtual reality generator of claim 35 wherein  
the plurality of display parameters comprise attributes  
of financial instruments.

48. The virtual reality generator of claim 35 wherein  
10 the user interface module includes means for displaying a  
simulated cockpit.

49. The virtual reality generator of claim 35 wherein  
the virtual reality world is divided into a grid of sub-  
15 regions.

50. The virtual reality generator of claim 49 wherein  
the virtual reality world represents the financial  
information for a single industry and each sub-region  
20 represents the financial information for the single  
industry in a plurality of markets.

51. The virtual reality generator of claim 49 wherein  
the virtual reality world represents the financial  
25 information for a single market and each sub-region  
represents the financial information for a plurality of  
industries in the single market.

52. The virtual reality generator of claim 49 wherein  
30 the virtual reality world represents the financial  
information for stocks, options and bonds in a single  
market and each sub-region represents the financial  
performance of the stocks, options and bonds having a  
predetermined expiration date in a predetermined industry  
35 group.

~~53. The virtual reality generator of claim 34 wherein~~

~~the financial information comprises financial information~~  
concerning stocks.

54. The virtual reality generator of claim 34 wherein  
5 the financial information comprises financial information  
concerning bonds.

55. The virtual reality generator of claim 34 wherein  
the financial information comprises financial information  
10 concerning commodities.

56. The virtual reality generator of claim 53 wherein  
the virtual reality world comprises a plurality of  
metaphors representing a plurality of stocks, each one of  
15 the plurality of stocks displayed in the virtual reality  
world satisfying the filter parameters.

57. The virtual reality generator of claim 56 wherein  
each one of the plurality of metaphors have shape, size,  
20 position, behavior and color to represent financial  
information concerning one of the plurality of stocks.

58. The virtual reality generator of claim 43 wherein  
the user defined texture includes a logo.  
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59. The virtual reality generator of claim 35 wherein  
the virtual reality world is updated at least 30 times  
per second.

30 60. The virtual reality generator of claim 34 wherein  
the virtual reality generator module includes means for  
generating and simultaneously displaying a plurality of  
virtual reality worlds.

35 61. The virtual reality generator of claim 37 wherein  
the user interface module includes means for selecting  
~~one of the plurality of metaphors and wherein the virtual~~



~~reality generator module includes means for displaying~~  
information relating to the selected one of the plurality  
of metaphors.

- 5 62. The virtual reality generator of claim 61 further  
comprising means for producing sounds relating to the  
selected one of the plurality of metaphors.

63. A computer system to create a virtual reality world  
10 representing financial information, the computer system  
comprising

an input port receiving as input financial  
information;

a programmable processor coupled to the input port  
15 including means for generating the virtual reality world  
from the financial information;

a display device coupled to the programmable  
processor for displaying the virtual reality world; and

a control device coupled to the programmable  
20 processor to control display of and movement through the  
virtual reality world.

64. The computer system of claim 63 wherein the  
programmable processor is a microprocessor.

25 65. The computer system of claim 63 wherein the display  
device is at least a 20 inch, high resolution monitor.

66. The computer system of claim 63 wherein the display  
30 device is a headset.

67. The computer system of claim 63 wherein the control  
device is a trackball.

35 68. The computer system of claim 63 wherein the display  
~~device is a binocular omni orientation monitor.~~

~~69. The computer system of claim 63 wherein the control device is a dataglove.~~

70. The computer system of claim 63 wherein the means  
5 for generating the virtual reality world utilizes a plurality of object-oriented library functions.

71. The computer system of claim 70 wherein the  
10 plurality of object-oriented library functions generate the virtual reality world.

72. The computer system of claim 63 further comprising a  
memory device coupled to the programmable processor to  
store the virtual reality world.

15 73. A virtual reality generator to generate a virtual reality world representing financial information, the virtual reality generator comprising:

an input module continuously receiving from a  
20 financial analytic system the financial information; and  
a virtual reality generator module for generating and continuously modifying the virtual reality world such that the virtual reality world correspondingly represents the financial information.

25 74. A virtual reality generator to display on a display device financial information as a virtual reality world, the virtual reality generator comprising:

means for receiving as input the financial  
30 information; and  
a virtual reality generator module including means  
for

(i) generating the virtual reality world  
representing the financial information,  
35 (ii) displaying on the display device a virtual  
~~reality world representing the financial~~  
~~information,~~

~~(iii) displaying the virtual reality world from~~  
a plurality of perspectives, and  
(iv) simulating, on the display device,  
movement through the virtual reality world.

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75. A computer system to create a virtual reality world representing financial information, the computer system comprising

an input port receiving as input financial  
10 information;

a plurality of programmable processors coupled to  
coupled to the input port including means for generating  
the virtual reality world from the financial information;

a display device coupled to at least one of the  
15 plurality of programmable processors for displaying the  
virtual reality world in stereoscopic form; and

a control device coupled to at least one of the  
plurality of programmable processors to control display  
of and movement through the virtual reality world.

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76. A virtual reality generator comprising:

an input module to receive packets of financial  
information at regular predetermined intervals;

display means for displaying on a display device a  
25 virtual reality world generated from the financial  
information; and

processing means for updating the virtual reality  
world when a new packet of financial information is  
received by the input module.

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77. The virtual reality world of claim 76 further  
comprising:

means for receiving input from a user; and

means for modifying the display on the display  
35 device in response to the input received from the user.

~~78. A method for displaying and manipulating large~~

~~quantities of financial information, the method~~  
comprising the steps of:

a. receiving as input pre-processed financial information;

5 b. controllably selecting a part of the pre-processed financial information for display;

c. generating a virtual reality world from the financial information selected for display, the virtual reality world representing the financial information; and

10 d. displaying the virtual reality world.

79. The method of claim 78 further comprising the steps of:

e. continuously updating the virtual reality world  
15 using the pre-processed financial information; and

f. simulating movement through the virtual reality world.

80. The method of claim 78 further comprising the step  
20 of simulating movement through the virtual reality world.

81. The method of claim 78 further comprising the steps of continuously updating the virtual reality world using the pre-processed financial information.

25 82. A method for displaying and manipulating financial information, the method comprising the steps of:

a. receiving as input the financial information;

30 b. generating a virtual reality world from the financial information, the virtual reality world representing the financial information; and

c. displaying the virtual reality world.

83. The method of claim 82 further comprising the steps  
35 of:

d. continuously updating the virtual reality world  
~~using the financial information, and~~

~~e. simulating movement through the virtual reality~~  
world.

84. A method for displaying and manipulating financial  
5 information, the method comprising the steps of:
- a. continuously receiving as input packets of financial information;
  - b. generating a virtual reality world from the packets of financial information, the virtual reality  
10 world representing the financial information;
  - c. displaying the virtual reality world.
  - d. updating the virtual reality world when a packet of financial information is received; and
  - e. simulating movement through the virtual reality  
15 world.

add  
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